Assessment of Juvenile Salmonid Emigration Monitoring on the Lower Sacramento River

Stan T Allen

Public Comments

No public comments were received for this proposal.

Technical Synthesis Panel Review

Proposal Title

#0284: Assessment of Juvenile Salmonid Emigration Monitoring on the Lower Sacramento River

Final Panel Rating
adequate

Technical Synthesis Panel (Primary) Review

TSP Primary Reviewer's Evaluation Summary And Rating:

In this proposal, investigators will 1. evaluate the efficiency with which a principal monitoring trap for juvenile salmon –Knight's Landing screw trap – operates and measure possible bias associated with flow events, turbidity, and size selectivity; 2. sample an under–represented 120 mile stretch of the Sacramento River (with intercept screw traps) for juvenile salmon that will ultimately be accessible to the screw trap; 3. consolidate salmon egress data from several intercept monitoring stations in the Sacramento River and assemble "production models for Chinook salmon"... "to the extent the ..data will allow." Previous efficiency studies depended upon depletion studies of marked salmon. Depletion is based upon evacuation of salmon from a given reach of the river, which in turn can be confounded by flow rate. Gear comparisons (fyke net and trawl sampling) downstream, and strategic releases of hatchery juveniles upstream of the Knight's Lndg screw trap are planned. The use of multiple gear and hatchery releases of known size is intended to allow estimates of size selectivity of the screw trap. A large release (not specified in the proposal) is envisioned to improve precision on trap efficiency estimates. Evaluation – Adequate

Additional Comments:

The study has nice experimental elements and given the importance of the monitoring station to water management decisions (i.e, Knight’s Lndg as early warning system), it seems critical to fully evaluate its efficiency in monitoring salmon. Sampling in the large reach up stream of the Knight’s Lndg trap also seems warranted to corroborate trends observed at that trap with upstream demographic trends. That there is not currently a coordinated database across monitoring intercept sites seems surprising given that most of these are DFG programs. Also, it seems surprising that literature estimates of efficiency do not exist for differing flows and turbidities (was literature sufficiently reviewed?). Weaknesses included insufficient explication of analyses planned for gear comparisons and methods for evaluating gear efficiencies, justification for siting intercept locations in the middle reach of the Sacramento River, and lack of planned archiving and analysis procedures related to the synthesis objective. Research seems quite expensive. Outcomes will be directly relevant to management aims. The effort to compile and synthesize juvenile abundance data seems critical to biological reference points related to recruitment, spawner escapement, and cohort replacement rate, but in this proposal details were lacking and this effort seemed rather a fishing expedition. PI s seem well qualified to undertake planned sampling and release experiments, but should seek additional statistical support in setting up release experiment and analyzing gear efficiency/selectivity data. PI s indicate that they plan peer−reviewed publications, but none to date on related research has occurred despite 5+ years of related research. Reviewers were mixed but showed strong support for goal of better monitoring of egress at Knight’s Lndg and elsewhere in the Sacramento. Reviews were less favorable than they might have otherwise been due to perceived flaws in sampling design, exploratory nature of data synthesis exercise, lack of testable hypotheses and contributions by an expert statistician, inadequate measurement of environmental variables (turbidity as part of gear efficiency study; other environmental variables as the escape catch rates at traps set in the middle section of the Sacramento River, and the expense

of the project.

In this proposal, investigators will 1. evaluate the efficiency with which a principal monitoring trap for juvenile salmon –Knight's Landing screw trap – operates and measure possible bias associated with flow events, turbidity, and size selectivity; 2. sample an under–represented 120 mile stretch of the Sacramento River (with intercept screw traps) for juvenile salmon that will ultimately be accessible to the screw trap; 3. consolidate salmon egress data from several intercept monitoring stations in the Sacramento River and assemble "production models for Chinook salmon"... "to the extent the ..data will allow." Previous efficiency studies depended upon depletion studies of marked salmon. Depletion is based upon evacuation of salmon from a given reach of the river, which in turn can be confounded by flow rate. Gear comparisons (fyke net and trawl sampling) downstream, and strategic releases of hatchery juveniles upstream of the Knight's Lndg screw trap are planned. The use of multiple gear and hatchery releases of known size is intended to allow estimates of size selectivity of the screw trap. A large release (not specified in the proposal) is envisioned to improve precision on trap efficiency estimates. Evaluation – Adequate

Technical Synthesis Panel (Discussion) Review

TSP Observations, Findings And Recommendations:

Assessment of juvenile salmonid emigration monitoring on the lower Sacramento River

The panel recognized the problem as important and the PIs proposed a nice experimental way of measuring screw trap efficiency compared to the current methods. The results could provide valuable data to managers. Still, the reviewers and panel recognized that this study was primarily a monitoring study, not research. The panel noted that this proposal does not offer anything particularly novel. The panel also expressed concerns regarding the lack of a guiding hypothesis

and model for the study that had been reviewed by a statistician. The applicants also did not identify the statistician who would analyze the data, preventing the reviewers the opportunity to evaluate the expertise that would be available for this task.

Final Ranking Adequate

Technical Review #1

proposal title: Assessment of Juvenile Salmonid Emigration Monitoring on the Lower Sacramento River

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	**The goals are very clearly stated, and are internally consistent. The idea of evaluating and hopefully improving existing, on−going data collection measures is very important and timely, as few studies do a very good job of evaluating data collection.**
Rating	**excellent**

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full−scale implementation project justified?

Comments	**The study is justified, in that it can improve data collection measures that lead directly to management actions: regulation of flows in the Sacramento River, and timing of diversions, and evaluating the success of efforts to enhance stocks.**
Rating	**excellent**

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be

useful to decision makers?

Comments	**The research methodology for part one is very well designed, and meets objectives but there are some problems in the details. The proposers state that one of the potential problems with the use of screw traps is that they may have reduced effectiveness when turbidity is low, but their research design seems to primarily test another potential problem, that of size selectivity among types of traps. They should measure turbidity during trapping sessions, so that they can also look at the first issue. They may plan to, but it is not clearly stated. This carries over into part two: part one describes problems with screw traps, while part two plans to utilize them as the primary data collection method. The approach section of part two also does not give enough information on data to be collected in addition to information about fish. If there may be high mortality in the section of the river they will be examining, it would make sense to collect information about ecological variables that might explain this. They do mention temperature, but what about other indicators of water quality and other types of habitat quality? They plan to use Stream Evaluation Program Protocols, but which ones, and what about other protocols in the DFG habitat evaluation protocol? New data being collected in various studies questions some assumptions about salmonids and temperature, so it would be nice to have information about a variety of variables from this study. As for the screw trap methodology, what about collecting data from part one for at least one year, than running part two of the study only for the next two years, with choice of sampling procedure based on preliminary results of part one? Part three does not offer much detail in methodology of data analysis. It also seems like this could be accomplished in two years.**
Rating	**good**

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	**This is very high, the project is technically very feasible, and the agencies have the capacity to carry it out, it has a very high chance of success.**
Rating	**excellent**

Monitoring

If applicable, is monitoring appropriately designed (pre−post comparisons; treatment−control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	**The project primarily consists of monitoring and evaluating the success of data collection efforts, so monitoring does not seem to be a critical part of this project.**
Rating	**not applicable**

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	**The products should be very useful. However, they could certainly take them one step further, to clearly being obligated to produce recommendations, based on their findings, to improve data collection and analysis, especially from part 3. Could they draft a proposed inter−agency data collection coordination plan?**
Rating	**good**

Additional Comments

Comments	**I would point out to CALFED that not only does this project increase our knowledge about target species, it also has the potential to give us information that can improve water delivery strategies by decreasing the environmental impact of these activities.**

Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	**The authors, and their home agencies, should be able to carry out this project very effectively. However, perhaps it could be improved even further by involving university (CSU and UC Davis) faculty in guiding further design and data analysis? It seems like a great project to serve as the basis of a Master's of PhD thesis for the technicians?**
Rating	**excellent**

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	**The budget seems large for this project. Some savings might be possible if part 1 was run years 1–3, part 2 years 2 and 3, part 3 years 1 and 2?**
Rating	**good**

Overall

Provide a brief explanation of your summary rating.

Comments	**There are still some concerns about data collection methods, especially for part 2. However, if the**

	project was carried out as described, it would definitely be valuable.
Rating	**very good**

Technical Review #2

proposal title: Assessment of Juvenile Salmonid Emigration Monitoring on the Lower Sacramento River

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	**The goals of the proposed research are three: (1) evaluate salmon estimates made with rotary screw traps, (2) establish baseline population monitoring between Knights Landing and GCID to better understand movement and survival of fish in this reach, and (3) synthesize existing information to develop empirically–based production models.** **Five hypotheses are presented. They are not testable hypotheses. For example, H1: The current rotary crew trap sampling program at Knights Landing is effective at detecting the emigration of small numbers of juvenile Chinook salmon and steelhead into the Delta. How is this to be tested? No methods are presented, nor is there presentation of any decision process. What are "small" numbers? How is effectiveness to be assessed? Or consider H5: Results from exiting (and recent) monitoring provide a logical and useful picture of the production dynamics of discrete runs of Chinook salmon.... How is one to objectively assess "useful" and "logical?" These are naive, uninformed hypotheses.** **Is the idea timely and important? Well, the proposal suggests that survival may be limited by residence in one poorly sampled portion of the study system (between Knights Landing and GCID) and that residence may be affected by hydraulic conditions. This is an**

	interesting possibility, which has obvious management implications.
Rating	**very good**

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full−scale implementation project justified?

Comments	**The conceptual model proposed is simple, that survival of salmon in the Sacramento River differs among stream reaches and may be limited by the time spent in residence between Knights Landing and GCID.** **Currently, production/surival is indexed by catches at Knights Landing. This information is used in real−time river management. One aspect of the proposed study, an assessment of the rotary screw traps is intended to answer questions about the adequacy of these traps. Adequacy will be determined by comparing catches of tagged hatchery−reared fish made by the rotary screw traps with those of other gears. Evidently, there will be six assessments made, at a unit cost of nearly $100,000.** **Unrelated to the gear assessment, the proposed study will monitor survival of salmon upstream from Knights Landing, in an area which is thought to represent a bottleneck to salmon survival/production.** **Finally, the proposed research includes a synthesis of existing information towards development of a production model.** **The gear assessment aspect of this study is overpriced and unnecessary. The efficacy of rotary screw traps has been established in the peer−review literature. I can see local interest in establishing the ability of these traps to sample small numbers of fish, however,**

	the proposal does not purport to be such an assessment. Instead, 15,000−25,000 tagged fish will be released in each of 6 events and then catches, numbers and sizes of fish, will be compared among gears. Why? There is no evident interest in replacing the rotary screw traps, just in assessing the representativeness and efficiency of their catches. Given that marked fish, of known lengths, will be released, there is NO reason to include the additional gears. Put the effort on the question of importance. I suspect the extra gears are included solely to make the work seem more cost effective or cost real. This study component is WAY, and I mean WAY, over priced. There are what, 6 full time year−round persons allocated to the 6 one week events?
Rating	**good**

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	**A portion of the proposed study will provide important information on survival of salmon upstream from Knights Landing. This should help guide recovery and management efforts.** **The synthesis of existing information is not well documented. They will assemble 1995− todate information and produce a model. Well, what kind? To what specific uses will the model be put? How will it's output and predictive capabilities be assessed?** **The gear comparison? Too little for too much, and too much (fyke nets, etc) is too extraneous. I do like the general approach− stocking tagged fish and then recovering them. This should allow a good assessment of sampling properties of the traps.**

Rating	**good**

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	**The PIs will be able to assess comparative gear effectiveness. However, the ability of the rotary screw traps to sample small numbers of fish may not be determined. The design might be modified to include releases of differing numbers of salmon.** **The PIs should be able to establish a baseline monitoring program for the river reach between Knights Landing and GCID.** **I cannot evaluate the feasibility of the data synthesis. Certainly, data are available, but I cannot determine how they will be used and what kinds of products are planned.**
Rating	**good**

Monitoring

If applicable, is monitoring appropriately designed (pre−post comparisons; treatment−control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	**The monitoring component of this project will be interpretable, but are not integrated with other aspects of the proposed study.**
Rating	**good**

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the

project?

Comments	**Given the wide use of rotary screw traps, information on their sampling properties will be of general interest. However, the proposed study will provide a LIMITED assessment of these properties. Far too much money will be spent on manpower, especially given the limited sampling to be conducted.** **Information on the survival of fish between Knights Landing and GCID addresses the question of whether this area is a bottleneck.** **The synthesis? I cannot evaluate something so poorly described.**
Rating	**good**

Additional Comments

Comments	**Executive summary is way too long!**

Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	**The project staff should be able to satisfy the first two study goals: study gear effectiveness/sampling properties and monitor fish between Knights Landing and GCID. The synthesis is to be conducted by a hired analyst to be identified later. It is hard to assess the analyst's credentials, however, this person evidently will be given a poorly defined charge.**
Rating	**fair**

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	**The gear effectiveness component is way overpriced. I cannot state this emphatically enough.** **Funds for monitoring salmon between Knights Landing and GCID appear to be adequate, perhaps a bit low, but I assume there is other support available.** **The data synthesis portion of the project is well funded. If I knew exactly what was to be done, I could comment further on this portion of the budget.**
Rating	**fair**

Overall

Provide a brief explanation of your summary rating.

Comments	**I gave the budget a Fair rating because, yes, I think the gear evaluation is way overpriced.** **I think this could be a competent study with a few changes. (1) I see no need to compare gears, rather, the effort should be placed on detailed study of the effectiveness and sampling properties of the rotary screw traps. Increase to the extent possible the number of hatchery releases and, therefore, sample size. Vary the numbers of fish released. Given the budget request for this project, I would think it would be possible to decrease manpower funds and greatly increase numbers of fish! Do not pay $100 K per 1 week sampling event. (2) Monitoring portion is, fine. (3) Be much more specific about the synthesis and how EXACTLY it contributes towards this project–**

	what are the products, how will they be used and interpreted, etc. (4) Overall, I would like to see a proposal in which the various components all addressed the same issue. This proposed strikes me as three of unrelated studies united only by geography.
Rating	**good**

Technical Review #3

proposal title: Assessment of Juvenile Salmonid Emigration Monitoring on the Lower Sacramento River

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	**The goals, objectives and hypotheses associated with this research proposal are clearly identified and internally consistent. They have done an excellent job of identifying the major five hypotheses that this project addresses. The idea is very timely and important. Many water management decisions are being made based on the Knights Landing juvenile Chinook sampling. This research will be able to evaluate critical issues associated with these data and significantly contribute to our understanding of juvenile survival and production within the Sacramento River.**
Rating	**very good**

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full−scale implementation project justified?

Comments	**I have a mixed reaction here. Certain elements of the study are very well justified given our current uncertainty regarding the relationship between juvenile capture and total production. The subsampling of 120 river miles to better understand juvenile survival in that section of**

	the Sacramento river is also well justified and important. However, the conceptual model of emigration, though well developed has a fundamental problem: The functional relationship between early fall storms (causing river flows > 20,000 cfs) and juvenile Chinook survival (which they identify as a "major conceptual underpinning of the proposed work elements in this proposal") is driven by one data point observed in early November (see their Fig. 4). Removal of this single data point removes the linear relationship (the remaining four data points lie along a straight line parallel to the x-axis). This implies to me that their major conceptual underpinning contains a serious weakness that needs to be resolved before all elements of this work are funded.
Rating	**fair**

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	**The sampling approach is generally well designed with the exception of the fyke net placement. "Fyke nets will be deployed from the rear of the rotary screw traps for surface and mid-water samling" is an unacceptable desgin. The rotary screw traps have already removed part of the population being sampled and one cannot determine the true efficiency of the Fyke nets with this samling protocol. These nets need to be positioned and achored independently of the screw traps. Otherwise, the remaining sampling methodology is well designed. The hiring of a "research analyst" to pour through the data for three years searching for relationships between variables is**

	ill conceived. The certainty that such an analyst will find something is very high (if not assured); the scientific defensibility of such a finding is highly questionable. Statisticians have shown time and again that such data mining leads frequently to spurious correlations and they provide guidance to avoid this problem. One major safe guard is to have specific, well-defined hypotheses before analyzing the data. This is lacking from the current proposal. I consider the proposed data synthesis approach as a fatal flaw in the overall scope of work.
Rating	**poor**

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	**The sampling approach is very feasible. Modifications to proposed net deployments are necessary to achieve the objectives they identified. The major weakness with regards to feasibility comes from the lack of staff available for or assigned to this project. The authors propose to hire people to fill their field and analyst positions. However, an experienced field lead and statistical lead is critical to the success of this program. Hiring advertisments do not constitute a technically feasible approach in my opinion. It is conceivable that the first (and maybe even the second) year of sampling could be lost as a new crew "learns" the sampling equipment and the unique challenges of working on the Sacramento River. I suggest that both a field lead and an analytical lead (the latter possibly drawn from academia) be identfied to improve the likelihood of success of this important project.**
Rating	**poor**

Monitoring

If applicable, is monitoring appropriately designed (pre−post comparisons; treatment−control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	**Not Applicable**
Rating	**not applicable**

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	**The products from this work are potentially of high value because it would contribute to the ability of scientists and managers to interpret the capture data at Knights Landing. It would also further our understanding of the Sacramento River system. The product from the data synthesis component, however, would be of questionable use and quality. Teaming with a highly experienced biometrician (from academia) would further that data synthesis task and help to produce scientifically credible products from such an effort.**
Rating	**fair**

Additional Comments

Comments	**As you may note, I am conflicted about this proposal. The proposed sampling gear assessment at Knights Landing and the reconnaissance monitoring are important and necessary steps to improve our understanding. However, I have serious reservations about the sampling design, and proposed data synthesis procedures that prevent me from fully supporting the proposal as submitted.**

Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	**The track record of the authors is very good. The qualifications and capabilities of the project team, however, cannot be fully evaluated. The proposal is to hire the team and simply provide the position description/ solicitation as evidence of the capability. Unfortunately, I find this approach weak and a potential fatal flaw. My recommendation is to ask the authors to identify highly experienced leads for the field sampling and data synthesis components to ensure the success of the project. For example, the difficulty of sampling in a large river system such as the Sacramento River could lead an inexperienced crew to spend the first (and even second) sampling season learning how to cope with the unique sampling issues/problems of big river systems. Similarly, a data analyst may spend years mining the data to come up with spurious correlations that have very little managment value. Technical leads in these areas are critically important, and need to be identified in the proposal to adequately assess the team capability. It appears that the authors have the necessary infrastructure and equipment to complete this work (although this was not specifically addressed in the proposal).**
Rating	**poor**

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	**The budget seems reasonable and adequate for the scope of work proposed. Lack of field and analysis leads (which could add costs) may increase the cost of doing this work.**
Rating	**good**

Overall

Provide a brief explanation of your summary rating.

Comments	**I view the questions being asked in this proposal as critical to our understanding of salmon and steelhead production. However, I consider the flaws in the sampling design, the unfettered data analysis, and the lack of identified (and reviewable) field/analysis personnel as fatal flaws of this proposal. I suggest that the authors find (and identify) a highly experienced field lead and a biometrician (from within their respective agencies, consulting firms, or academia) to oversee/train the newly hired personnel needed to fully staff the project team. This would ensure a technically successful and sceintifically defensible product from this important research project.**
Rating	**poor**